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ABSTRACT

Communications technology that is or will soon be available can help create better opportunities for mass discussions about public issues. The hardware and software prerequisites for such discussions are: capacity to address participants, facilities for real-time dialogue between geographically dispersed groups, continuous feedback between audience and broadcasters, techniques for recording responses and reporting group feelings, provisions for injecting expert information into the dialogue, rules to regulate access, and provisions for subpopulation in inter-subpopulation dialogue. With these facilities millions of participants could be subdivided into a network of discussion groups. Groups of up to 30 could be formed by conference telephones, small communities of up to 2,000 could take part in discussions via two-way cable television, intermediate communities of up to 40,000 by radio, television and regular telephones, and larger entities could be made of networks linking all of the above. (MG)

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MINERVA: A STUDY IN PARTICIPATORY TECHNOLOGY

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This is a preliminary report on the basic conception which guides a National Science Foundation study, "Minerva--Participatory Technology," (GI-29940) conducted under the auspices of the Center for Policy Research. Principal investigators are Amitai Etzioni and Stephen H. Unger.

Amitai Etzioni

MINERVA: An Electronic Town Hall*

Preface

This paper presents the specifications for an electronic technology that will allow masses of citizens to have discussions with each other, and which will enable them to reach group decisions without leaving their homes or crowding into a giant hall. First, the specifications of the components needed for such a participatory system are enumerated; they are deliberately separated from a description of a concrete system, as different concrete systems may provide the same basic components. Next, a concrete, and as far as can be projected, workable system, is suggested. (It would not be available in full before 1985 and then only if it is "accepted"; hence the system must be considered before there is a complete prototype).

Once the basic model has been described, possible variations are explored. The paper closes with a discussion of uses other than participatory that the system may be put to. Such additional uses will, of course, affect the cost of any single use, including that of the desired participatory technology.

*This study, supported by the National Science Foundation, project # GI - 29940, is being carried out under the auspices of the Center for Policy Research. Dr. Stephen H. Unger is co-principal investigator with the author. Papers by Dr. Unger and other team members are available from Center for Policy Research, 475 Riverside Drive, New York, New York.

MINERVA:
An Electronic Town Hall

I. THE RATIONALE FOR SEEKING MINERVA

The system suggested in this paper seeks to correct a loss brought about by modern mass society and heretofore considered beyond retrieve. It is widely believed that it would be impossible for millions of people to have the kind of participatory democracy available to the members of small communities such as the Greek polis, New England towns, and Israeli Kibbutzim. In contemporary modern societies, there are no effective means by which large groups of citizens, whether dispersed across the country or clustered in a single community, can regularly interact among themselves or with their leaders. In some instances people may, after considerable delay, indicate their responses to broadcasted messages by means of letters or petitions that are in turn broadcast. But live (real-time) dialogues have been virtually impossible, and communication remains mostly unidirectional. One result of such unidirectional communication is the increasing alienation of the citizen from political and social processes; another is the making of decisions that are unresponsive to the real wishes or needs of the people and, as such, widely resisted. (Prohibition and the busing of school children are examples.) In addition, there is little opportunity for

mutual influence to occur, or for an authentic group consensus to evolve.

At last there is a basic conception of the attributes needed to create a technological system that will allow a large number of citizens, dispersed throughout their communities and throughout the nation, to dialogue with each other regularly and to form their positions on public issues as a group. Following a limited number of technological and social innovations to be outlined here, it will be possible, to a very large extent, to approximate the town hall meeting condition on a mass basis. This envisioned system of mass participation draws on a combination of some already existing and some new technological features in conjunction with new social procedures (or "protocols").

Several questions have been raised about this mass participatory system. Will people want to use such a system? Will it serve to reduce alienation and correct social injustice, or will it simply cater to the lowest common denominator? Finally, will the cost of such a system be prohibitive, or at least higher than people would be willing to pay?

As these questions have been thoroughly discussed elsewhere[1], the answers are only reviewed briefly and then the main purpose of this paper--to depict a mass participatory technology--is confronted.

The demand for greater citizen participation in national

and local affairs, as well as in various so-called "private governments" (such as those of universities, hospitals, schools, and other institutions), is one of the most striking characteristics of the last few decades. It is one of the key demands shared by large numbers of youth, the minorities, and the women's movements, as well as by working-class persons.

Participation is sought largely when citizens feel politically effective, not when they sense that their votes or presence in a meeting make no difference.[2] In circumstances where people feel they actually have a role to play, they are more likely to inform themselves. Exactly how much information can be absorbed is both far from established and highly debated; but it is clear that while not everyone can or will understand all the technical details, the majority of the citizens may quite effectively understand the main issues, such as war vs. peace, inflation vs. unemployment, etc.[3] This is particularly true when the issues are of great importance to people (perhaps a debate over a school bond, a proposed highway, or a housing project) and when they feel that they can, or should, play a role in the decision-making process. The furor over the scheduled construction of a low-income housing project in a middle-class neighborhood in Flushing, Queens, is a case in point. As people find that their participation has a definite influence on the decisions finally reached, they, and other citizens, are increasingly likely to

avail themselves of future opportunities to participate. As the general level of education improves and people have more free time, participation in community affairs might also increase.

Whether informed and active citizens generate more conflict or more consensus, have greater feelings of alienation or of involvement, will depend on the way the system for mass participation is used (see below discussion of rules of access), as well as on general societal conditions. If citizens sense that their needs are ignored, the new technological system may well make them more aware of this condition, because of the increased communications between them. But if their expectations are unrealistic, it might help them adjust their aspirations. Thus, quite appropriately the participatory technology is likely to help those who seek genuine citizen participation by responding solely to their educated and "consensuated" needs.

As to the cost, the participatory features can be an auxiliary, or "add on," to systems that already exist, such as over-the-air network TV, radio, and telephone, or to systems which are desired for other, commercially viable purposes. As an "add-on" feature, the system suggested is rather inexpensive. Thus, for example, two-way cable television (CATV), where the return capacity is for sending digital signals (not video, and maybe even not audio), is attractive as a shopping device. (The viewer can order products displayed on the screen, in a kind of "live"

mail catalogue.) This same device can also be used for public opinion polling at very little additional cost. Hence, it seems that a system that would lead to greater citizen participation might well be beneficial and economically viable.

One attribute of the system that is considered essential if it is to have the said consequences, and which should be highlighted because it deeply affects the design of our system, is that dialogue among citizens and between them and their leaders precede the polling of views. The system being sought is one of mass dialogue and response, not one that merely tallies votes. Both political theory and the practices in Hitler's Germany and Napoleonic France have shown that bringing a motion before the populace to be voted on "raw," i.e., without discussion, opens the society to demagogic influences. In a truly democratic process there is a genuine dialogue among the citizens and between them and their leaders before a vote is taken. One main purpose of this is to broaden the understanding of the citizens through pluralistic sources of information. It also allows the citizens to take into account the views and feelings of fellow citizens who are <u>not</u> like-minded. Without such a dialogue, the positions that citizens are likely to take tend to be impulsive, uneducated, and unnecessarily polarizing. <u>A reasoned, informed, and broadly-shared position requires dialoguing</u>. This is an assumption that runs throughout the system that is next discussed.

II. THE SPECIFICATIONS OF THE SYSTEM: A MODEL

1. An optimal version of Minerva

An optimal mass dialogue and response system--or, more technically, a "Multiple Input Network for Evaluating Reactions, Votes and Attitudes", MINERVA for short (Minerva was the ancient Roman goddess of political wisdom)--will provide a means for people to communicate with each other as groups and with central broadcasters.[4] MINERVA is now being developed at the Center for Policy Research in New York. Its prerequisites are:

(a.) a capacity to address a group (or to broadcast),

(b.) a real-time group dialogue of a geographically dispersed membership,

(c.) a continuous real-time feedback between the audience and the broadcasters (national or local political leaders or opinion-makers), under conditions approximating town hall meetings,

(d.) the recording of participants' public responses and the reporting of the evolving group consensus (or its absence) to participants,[5]

(e.) the injection of expert information into the dialogue,

(f.) the establishment of rules that regulate the accesses and utilization of the system and have a capacity to be revised according to the responses of the participants,

(g.) the provision of opportunities for sub-population dialogue, inter-subpopulation dialogue (e.g., of the black

communities of New York City, Los Angeles, Chicago), as well as various combinations of subpopulations (e.g., of the five boroughs of New York City in a city-wide network).

None of the technologies that are described below provide for all of these elements single-handedly. However, when put together in various mixes and following some adaptations, they could provide such a system. Before turning to these technologies, some of the more important uses of a fully developed system of dialogue and response will be mentioned.

In a completed system, every person who owns a radio or a television set and has access to a telephone will be able to follow, react, and participate in the discussion and resolution of public affairs. Thus, an electronic equivalent to town hall meetings is provided, allowing dispersed groups to act as if they are all in one central gathering place.

Communications among the people involved may never acquire the immediacy of actually being in one room. However, the system may actually expand participation by opening it to people who are not sufficiently committed to the issue under discussion to attend meetings in person, but who are interested enough to turn on their radio or TV sets. By following a discussion in this way, a person can gain a feeling for it before deciding whether to participate in person. Furthermore, MINERVA provides an opportunity for the shy and the timid to participate actively in

meetings; they can respond without the anxiety that direct exposure to the group would arouse. Also, it allows persons who cannot afford baby-sitters, are not well, or fear to leave their homes at night, to "attend" the meetings.

MINERVA will also provide the opportunity for frequent and intensive dialogue between geographically separate communities. (This requires linking local sub-networks to national networks, probably via satellite.) For example, residents of Harlem, on the East Coast, and Watts, on the West Coast, may meet periodically in joint town hall meetings, in which they listen to each other's spokesmen. Or, finally, communities that find it difficult to meet en masse, such as the white, affluent community of Scarsdale and the poor, black community of Harlem, may exchange views via such a network, whenever they wish to set aside a time unit for such a dialogue.

Such a system of dialogue and response can operate on many different levels with technologies appropriate for each level. The various possibilities are examined next.

2. The Communication Tree

The main device that allows millions of people to dialogue and create authentic consensus, and which has the potential to affect public policy, is the division of the citizenry into small groups. The members can discuss matters with each other and then delegate representatives to the next level, where the delegates in turn dialogue with each other and so on, until the

society-wide level is reached.[6] In the U.S., this device operates both in the political primaries that precede party conventions and in the discussions in neighborhood political clubs that precede city-wide party decisions. Dialogues and resolutions on higher levels can be made visible to those who participated only in lower levels, and the final, system-wide resolution can be submitted to all participants for approval or rejection.

The following communication tree, which combines several technologies, offers a four-level dialogue and response system:

(1.) for small groups (up to 30 persons), via automated telephone conferencing;

(2.) for small communities (300-2,000 persons), via two-way cable TV, where available;

(3.) for intermediate communities (6,000 to 40,000 persons), via a combination of radio or over-the-air TV with regular telephones;

(4.) for still larger entities, including national and international ones to be referred to as societal entities--via networks that link the communication systems of intermediate communities: cable, micro-waves, TV relay stations, or satellite.

Note that the larger entities assume that the smaller ones exist within them. Thus, a small community of 300 people may

include 10 sub-groups with 30 people in each. And an intermediate one of 40,000 people may contain four small communities with 10,000 people in each.

The features of each level are now explored and the reasons for choosing these particular levels given. After the envisioned communication patterns for each level are introduced, inter-level connections and combinations and the different kinds of communication trees are discussed. However, for the first go-around it might be useful to assume that the people who dialogue and respond live next to each other (rather than dispersed throughout a city, a state, or the nation) and that they do not necessarily know each other personally. It is also assumed that delegates from a lower "tree" level (e.g. a group of 30 persons) who are spokesmen at a higher level (e.g. a small community of 900 persons) are the choice of the communicating group itself rather than the previously elected or appointed representatives of a different collectivity.

Finally, while the communication tree might be activated from any level, and the activation process might move up, down, from the middle down and up, or sideways, it is assumed, for ease of narration, that the activation starts with a society-wide "priming" broadcast by one person or a panel, is followed by a discussion that percolates upwards from the smallest to ever more encompassing levels, and culminates in a nation-wide dialogue and vote.

3. Key features that appear on all levels

In order to reproduce, with technological aids, features of a town hall meeting that are practical for a mass of people, the elements of an effective dialogue and response system need to be known. Obviously the system will contain one or more speakers, who address themselves to a topic on the agenda, and who seek the floor by a procedure (or rule of access), with a chairman (or some equivalent) granting the floor. Devices for requesting the floor, awarding it, and, perhaps, protecting the speaker from undue disruptions are needed.

Less obvious are the intra-citizen and inter-citizen processes. As a rule, citizens do not come to such meetings with their positions fully developed and cemented, or the whole process would be senseless. In evolving their personal position and in "moving" toward or away from each other, the speakers and various factions (if any) are affected by non-verbal cues, such as those of approval (applause, shouts of "yeah-yeah" and "right on!"), disapproval (hissing, booing), and apathy (restlessness, dropping out of the meeting). Without such cues, the process of position-formation by a group, as well as by its individual members, might be severely hindered. As these are partially omitted in any non face-to-face arrangement, it might be useful to replace them electronically. Thus, the suggested system seeks to provide for these less obvious features of

town hall meetings as well as for the more obvious ones.

Finally, the system must provide for a vote (as distinct from an expression of the sense of the group). The vote constitutes a formal group expression vis-à-vis the resolutions on the floor. Of course, a vote may come after a few meetings or after only one; it may concern the agenda or the chairman's status as well as substantive positions. In any event, the group processes "lock-in" after one or a set of votes have been taken at the end of one or more dialogue sessions. And, even if the dialogue occurred in many groups and on several levels, a system-wide vote should be possible after the final round.

III. A CONCRETE MODEL

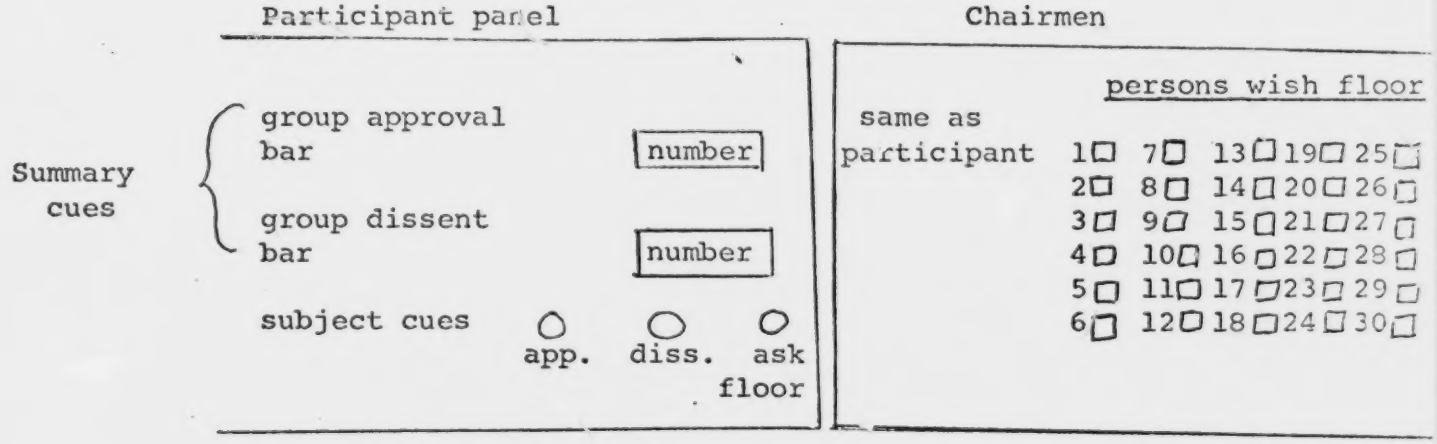
1. Small groups (up to 30 persons): Telephone Conferencing

The telephone, as we know it, is almost completely dyadic. It is basically a two-way, two-person, audio-only, technological means of communication. Group telephoning is now available with a conference "bridge," but since the bridge requires manual operation--a person to set up each conference at considerable time, effort, and hence, cost--it is not used routinely. The most modern switchboard (ESS) allows two persons talking with each other to dial-in a third one, and then a fourth one, but no more.[7] This is a significant but limited step toward automated conference calls, which are needed for a large-scale, frequently used, inexpensive system.

The next step is an automated system that connects up to 30 persons, either by dialing-in or by a computer that calls all the numbers simultaneously. The ability to connect this many persons is needed because many natural groups have more than four members (e.g. most committees) and because starting a communication tree with a base composed of groups of four requires 14 levels, whereas one that starts with 30 requires only 6 levels.[8] Of course the number 30 is only an approximation; a somewhat smaller or larger group may prove to be necessary for the most effective dialogue. The MINERVA research has already established that groups of 9 members work quite readily in automated conference calls. Richard Remp, a MINERVA researcher, has conducted a series of 29 nine-person telephone conference calls in which specific social problems were discussed. Afterwards, the 261 participants responded to a questionnaire on the merits of telephone discussions. Sixty-seven per cent of the people indicated that they were able to get the floor easily, 65 per cent felt the discussions were effective, 73 per cent felt their vote on the topic was a good indication of their position, and 71 per cent called the technique very useful.[9]

The MINERVA circuit that is being developed has the following four <u>feedback</u> features (<u>other</u> than the voices of the participants, whose sub-verbial sighs, grunts of approval, etc., carry quite audibly): (1) an "I request the floor" cue capacity, (2) an

electronic means for signifying positive and negative responses, (3) an electronic way to register a vote, and (4) summary cues which make the group visible by reporting to each participant--speaker and audience--the group's responses and tally of votes. The charts below show what one format of the feedback would look like to the participants.



Continuous feedback of the group feeling (the equivalent of "reading" the noise level in a hall) is possible; the sense of the group may also be assessed at the request of either the group members or the chairman. The technical demands of continuous feedback are necessarily greater than those of sporadic feedback. Sociologically, as well, continuous feedback may be undesirable because an overly precise or premature sense of the group may hinder the formulation of new ideas and minority expression. Even before votes are taken in town hall meetings, there is an imprecise sense of the group, which seems to provide a more conducive condition for free dialogue and quality

discussion. The best of both worlds might be realized if the group feedback prior to actual votes were provided not by numbers (e.g., 18 in favor, 8 opposed, remainder undecided) but either through summary bars, which avoid precise counting, or through some vaguer indication of individual cues. Scanning 30 lights gives an <u>impression</u> of the group feelings, but if a count is attempted some lights are likely to change before the count is completed.

Dr. Stephen H. Unger, a member of the MINERVA team, has suggested that it might be possible to cue the chairmen with the same touch tones as those used by the telephone company. (The problem of filtering out audible tones from the receiver circuit is under investigation.) Other methods are being sought in the hope of minimizing the adaptations necessary in the telephone system itself, as distinct from adding panels and bridges. Perhaps a gavel will be provided for the chairman, to "bip" (known in our team as a meek gavel) or cut off (a harsh one) speakers when they try to usurp the floor. Dr. Unger has also raised the possibility of automating the chairman's role by using the bridge to allot the floor for a set period to those who seek it, in the order for them to make their requests. (A further refinement would be to shorten the time allotted as the list of those in line grows: a warning light could alert the person who has the floor that his time will be up in, say, three minutes.)

Assuming all this becomes available, a time span of two hours can be set aside for small group dialogue after a system-wide "primary" broadcast and before a response tally is taken. The tally will be passed on to the next level of dialogue; that is, in the sequence reviewed here, dialogue in the small communities will start with a report of how the member groups expressed themselves. (If desired, one or more representatives of each member group, or a selected list of those representing groups which favored, opposed, and were divided on the issue, could present a summary of their groups' argument, to prime the small community's discussion.

2. Small Communities (300-2,000 persons): Group Cable TV

For communities in which cable-television is available in every house, as well as in public places such as schools, churches, political clubs, town halls, and entrance lounges of high-rise buildings (now envisioned for Wattburg, Conn., and Welfare Island Model City in New York, and, by 1985, expected in larger parts of the country), electronic conferences of several hundred persons seems possible. Following the primary national broadcast and small group telephone conferences, the dialogue may be extended to this level. Thus, if the national address is given at 10:30 A.M. on a non-working day, with telephone conferences between 11:00 A.M. and 1:00 P.M., the community dialogue may start, say, at 2 P.M. (Of course, some people may skip the first level; or the community

dialogue could directly follow the national broadcast.) The dialogue would be over the cable TV's so-called "origination" channels (those which do not carry network broadcasts). Citizens would be able to react over a feedback channel. This channel would carry audio as well as digital signals, such as votes and request for the floor. The system assumes a two-way CATV system (now in an advanced state of development) and the availability of a response box in each participant's home, similar to the one available to participants in the conference call system.

If all the 600 or more citizens who link up are within an area whose radius does not exceed 650 meters, as in a high-rise building, engineers report[10] that they should all be able to hear each other without special amplification. If all the audio-input home-mikes were always "live," without requiring special activation, an intolerable noise might be the result. But they can be inactive, requiring, for example, a button to be pressed to be activated, like walkie-talkies. This situation now approximates a town hall meeting: several hundred people are able to boo, hiss, grunt, shout approval, follow the group sentiment, etc., as well as vote. The dialogue barrier, the number of persons that this system can maximally accommodate, has yet to be established. This barrier would obviously vary from group to group, according to how "well-mannered" their communication habits are. Determining the optimal dialogue barrier is a matter that can not be divined or

argued. It is expected that for most socio-economic groups this barrier is located between 300 and 2,000 members.

Why use two-way cable TV and not telephone? First, some persons may wish to use the telephone for another purpose while other members of their family are engaged in the electronic town hall meeting. Second, there is a more technical question: Can the telephone circuits, presently designed for two persons, be amplified without very special arrangements to the point where, say, 600 people can easily dialogue? Third, cable TV is broad-band and hence can carry video signals both ways. While we do not expect every home to have a camera, the cable allows the center of the dialogue and video origination to be in any public meeting place or in any home using light and movable cameras, loaned or rented for the evening.

Also, it stands to reason that being able to see as well as hear the chairmen, and maybe other participants, and to present charts and tables visually, aids communication. People can pick up many additional "bits" this way.[11] Reliance on CATV rather than picture-phones is suggested because it is less expensive and carries a more detailed picture. Telephone networks are over-burdened with their present and projected business whereas cable TV has unused channels and is expected to have many more in the near future.

Finally, tallies of responses and votes can be fed back to

the participants more easily in the cable TV system, than over the telephone. The tallies may simply be flashed, like election results, on to the TV screen, rather than being read over the phone. Also, fairly complicated motions may be presented at voting time by using TV screens to display check-lists, which telephones cannot do.

3. Intermediate Communities (6,000-40,000 persons): Combination of Radio or Over-the-air TV with Regular Telephones

A different system is suggested for communities whose size puts them above the dialogue barrier, where it is not practical for everyone to dialogue on an open channel, either because the noise is too great, or because regulating the traffic is too cumbersome. Here one will rely on a dialogue among participants who have called in, by telephone, to a central broadcast station. Cable TV is not needed; a combination of local radio and regular (non-conference) telephones, or over-the-air TV (UHF, most likely) and regular telephones suffices. Hence, the system can also be used in small communities in which cable TV is not widely available.

The floor is obtained by telephoning the chairman to register a desire to address the group. When the floor is granted, the telephone call is broadcast over the air.

This system is expected to work best when the entire listening audience and the participating community are roughly co-extensive. For example, a town of 40,000 can use its local radio

station in this way. In metropolitan areas, where the number who could tune in is much higher and spread out over many neighborhoods, it is better to use cable TV because the sub-division of channels along neighborhood lines defines the group according to those who can and those who cannot tune in. (For example, there are ten such sub-channels or "head-ends" in northern and ten in southern Manhattan.)

If an over-the-air system is used, it will be necessary to allow on the air only people calling from one particular area. (They may be screened according to the telephone exchange through which they make their calls, or by some other device.)

Phillip J. Brendel of the MINERVA team has investigated various ways of tallying people's responses and votes rapidly and frequently in this kind of situation. This has to be achieved without requiring the people to call in their responses because such calls would distract them from watching and listening to the dialogue, would overload the telephone lines, and would slow down the tallies. The method that seems most imaginative and responsive to these considerations is that of telephone polling. Here, each telephone is equipped with a response box, into which the person registers his preferences by pressing buttons, after which the response is tallied.

The MINERVA team is now studying the time required to poll people using the telephone method. As of now, it seems that 100

people can be polled (assuming a 16 bit response) per second by one polling unit. As these units are not expensive, a large number of them might be used simultaneously. Thus, if one out of every two residents participate, ten polling units could poll a community of 20,000 in ten seconds. These responses would then be tallied and transmitted to the broadcasting center to be read by a radio announcer or flashed on a TV screen.

In addition to final votes, response tallies can be used to determine the agenda and whether to extend or close the debate, to change rules of access to the floor (see below), or to express the sense of the group on sub-points and tentative views on the whole issue (straw votes). These uses of tallying responses are the main replacement for sub- and non-verbal cues that telephone and two-way cable can carry. (These cues are missing in existing TV and radio panel and call-in shows because there is, in effect, no way for the listening audience to register its reaction.)

The size of the intermediate communities is set primarily by the desire to allow a sufficient diversity of speakers--representing all shades of viewpoints of the audience--to reach the floor. Technical limitations on tallying equipment and telephone exchanges also play a role in setting the size of the intermediate community. Forty thousand persons is used as a working upper limit for the size of the community, but it might actually be quite a bit lower, especially for active, verbal populations.[12]

4. Societal Entities: Cable, Microwaves, TV Relay Stations, or Satellite

A state, region, nation, or group of nations may all be covered by a system whose upper layer is a combination of a system-wide priming broadcast and two or, most likely, many more intermediate community systems of the kind already described. The broadcast can be carried over the air, on network TV, and the communities that make up the system can be connected via telephone cables, a TV relay station, satellite, or microwaves. System-wide polling would be achieved by feeding the tallies of each intermediate community to a central tally station, quite likely over telephone lines (as only digital signals, and not video communication, would be necessary).

The assumption here is that inter-citizen dialogue basically takes place within smaller, lower level units and that on the system-wide level, panelists--experts, leaders, mediators--participate (from central studios) by reacting to various feedbacks, which come in the form of frequent, system-wide tallies. Also, representatives of intermediate communities could address the societal system by telephoning in, to a central switchboard. If desired, the participation of some citizens in the dialogue can be arranged in this way. Thus, the societal system is essentially a second-order intermediate community system. The main difference, due to much greater size of the societal unit, is that the probalility that any one citizen or even community representative

will address the whole system is much lower. Therefore, there is a great need to rely on another kind of feedback. If it is available frequently enough, visibly affects the discussion (e.g., when the citizens' vote requires reopening an issue and the panel does so), and if it follows rather than replaces lower level dialogues, this feedback may give all involved an authentic sense of participation. By affecting the final outcome--whether helping to approve something or to vote it down--the citizens really will be participating.

Moving directly from the intermediate level of about 40,000 to a special level such as the nation might not be desirable because there are thousands of such entities and hence each unit's chance of presenting its views on the next level would be slim. This chance would improve significantly if one or more additional levels were provided. Therefore, a city-wide system might precede a state-wide one; regional tallies might be taken before the nation-wide tally, etc.

It is quite possible to start on a higher level, but once sub-groups have been identified, they could sub-divide in order to "caucus" while the meeting as a whole is temporarily adjourned. In this way, a more intensive dialogue will be possible. It will increase the probability that any one participant is able to address the group, rather than rely on tallies and cueing for feedback. After a period of time, the meeting of the entire group could resume. Another way in which these smaller electronic

meetings can be used in a society-wide system is for the whole group to elect a resolution drafting committee. Those elected would "leave" the "hall" and "meet" on their own, using a conference circuit. When they had completed their work, they would report back to the plenary meeting.

IV. ALTERNATIVE COMBINATIONS OF LEVELS AND GROUPS

The suggested dialogue and response system may be used in many ways, which would differ in one or more details from the optimal model depicted so far. Some of these alternative ways are reviewed next.

1. Use of one or two levels without the others

Any level may be used on its own or in conjunction with just one other level, disregarding the others. Thus, a national committee might find conference calls quite useful, especially if the calls are automated with various technical aids such as those already depicted. This would be the case even if no other electronic meeting followed or preceded such a committee meeting. Similarly, a 600 to 3,000 citizen cable conference similar in size to a town hall meeting, might well be useful, even if not preceded by small group conference.

2. Variation in composition of groups

For dialogue and response purposes people can be grouped in a large variety of ways--according to age (all those under 30 and all those above 30), ethnic origin, political viewpoint, or

various combinations thereof (e.g., age and viewpoint). In practice, though, there are severe limitations on what can be done without an undue increase in economic cost. It should also be pointed out that the various grouping criteria differ in the technological requirements they impose, which also restricts what can be done.

(a) Natural vs. artifical Consider the first level of telephone-conferencing. There can be provisions for people to choose their own groups, either via an extended dialing-in procedure, or a pre-set circuit (for instance, a Monday night public affairs group with a constant membership, although all participants may not "attend" every week). Or, all those who wish to dialogue can indicate this by calling in to a computer, which will then connect them onto conference circuits and thereby form the groups. Moreover, the computer may compose the groups according to some attribute specified by the callers. Some may choose to dialogue with like-minded persons, perhaps to organize themselves as a group to campaign for their position on higher levels. Others may request to speak with people whose views differ from their own, to win them over or to learn what others think and feel about the issue under discussion.

Similarly, chairmen for the small group conferences, as well as those who chair higher level conferences, may be natural leaders (emergent from the group), leaders elected by the group at conference, elected elsewhere (e.g., block chairmen, heads of

tenant committees), or appointed by higher ranking leaders. etc.

On the intermediate and society-wide level, groups may be linked up both horizontally and vertically, either along "natural" lines (such as linking together all the boroughs of a city) or randomly (where part of Manhattan might be linked with Poughkeepsie). Almost always, a preference for natural links is expected to prevail because social and political forces outside the communication network resist being ignored. Thus, if the most salient divisions in a community are along neighborhood lines (in effect, ethnic and class and educational ones), a dialogue and response system that cuts across these lines is unlikely to survive, especially once its political relevance is recognized.

This does not mean that the system will necessarily be establishmentarian; for example, black leaders may suggest that Harlem and Watts be linked to each other, rather than to their city systems--New York and Los Angeles respectively. But almost no one, in regard to most issues, is likely to favor random links. At the same time, there is considerable question as to what natural divisions to draw upon. While dialogue can be established along numerous and criss-crossing lines (e.g., Monday evening for the city; Tuesday for an ethnic group), the lines most commonly drawn upon, and above all, those which lead to tallies used in national combines, will significantly affect the nature of societal divisions and dynamics. For example, will MINERVA encourage us to think of the society as two nations, one black, one

white, without major regional differences, or as one nation composed of persons who live in various parts of it, each part with a different racial ratio, but where white and black citizens join together to support their local needs and interests?

Preference for the bases of composing dialogue and response groups, selecting chairmen, and lining up with other groups is largely a matter to be decided by the citizens and not by researchers. But researchers can highlight the options and alert the public to the possible consequences that various choices are likely to have. However, much of the necessary research has not yet been done. At this point, what can be done is to emphasize that each criteria for group selection leads to significantly different consequences in the level and quality of communication, conflict, consensus, and alienation.

(b) Adjacent vs. dispersed groups On all levels, geographically adjacent or separate persons or groups can be linked, although the greater the dispersal, the greater the tendency for technical difficulties and high costs. Thus, for the same volume of calls, whether a telephone conference links people in the same neighborhood (using one telephone exchange), across a city (which requires inter-exchange calls, where lines are much fewer than within one exchange), or throughout the nation (long-distance lines), will, of course, strongly affect the costs as well as the probability that lines are available. For the time being, it seems, mass

conference calls on a regular basis (as distinct from one special event, for which special equipment can already be assigned), will be practical only for local calls and might have to be limited to times when the system is not otherwise greatly used, such as on Sundays.

The problems imposed by non-adjacent groups seem particularly great when cable TV is used. While adjacent groups can use the same channel divided into sub-networks, non-adjacent callers--say, if the parents wish to talk about PTA matters without having non-parents participate--will need either (a) to set aside a "whole" channel for themselves (to which others could tune in), or (b) to be switched together manually for the evening, which is costly and requires a kind of cable network ("switched cable") that differs from the one now very widely used ("frequencies-division").

Small communities can be readily linked to intermediate ones, which can in turn, be linked to societal systems, if they are adjacent; if not adjacent, the dialogue and response system will require expensive networking arrangements. Thus, the cost of linking nine American cities for one evening for a participatory show on the Public Broadcasting Corporations' network has been estimated to include $15,000 for leasing long-distance telephone lines alone! In the future, satellite and microwave stations may ease the problem, but for the time being, adjacency (or total system) exposures and dialogue, have a clear technical and economic edge over non-adjacent ones.

1. Rules of Access: The Needed Social Procedures

Social innovations, or at least a set of experiments and decisions, will be needed before the new technological system can be used. Those "rules of access" (or mix of rules) that most effectively contribute to a successful meeting in a variety of situations will have to be established.

In any polity, an arena in which decision making occurs, there exist limitations on the opportunities for communication of opinions and preferences. Even if substantive restrictions are prohibited (everyone is guaranteed the right to speak at some point), there still remain temporal restrictions (everyone cannot speak at once). The structure that regulates participation of polity members is referred to as the rule of access. For example, in a town hall meeting the rule of access may be that the floor is yielded to the person who raises his hand and manages to catch the chairman's eye (and support). Theoretically, the rule may promise everyone the same chance; in practice, it is usually quite stratified.

For the purpose of developing MINERVA the following alternative rules of access are thus far being considered:

(1) Participants will be authorized to communicate on a first come, first served basis. The first person to indicate a desire to speak will automatically receive the floor.

(2) Random access: People to gain the floor will be randomly chosen from among those indicating a desire to address the group

e.g., by a computer picking one person from each block or every Nth caller.

(3) Access on the basis of popularity: Since the opportunity to speak will vary according to the extent to which the audience desires to listen to the prospective speaker, there will be fixed minimum time unit for each person who receives the floor. Thus, the opportunity to speak will be guaranteed to the less popular speakers, or randomly allotted among them.

(4) Minority preference: Special opportunities will be provided for some sub-groups in the polity that have a particular attribute (i.e., youth, expertise, ethnic origin).

(5) Access on the basis of representation: Access will be given to those who demonstrate that they speak for others. The manner in which a person is officially designated as a "representative" might include: prior leadership in a natural group in the "real" world, a specified number of signatures on a petition, a special election to select speakers in "lower" level groups.

(6) Access through neutral moderators: Certain persons will attempt to give objective reports "upward" to larger audiences on the content and sense of discussions held in the smaller groups. These "moderators" will be selected on the basis of their ability to summarize views, remain objective, and guide discussions toward a productive interchange.

Other rules can, of course, be designed; above all, various mixes of rules already suggested seem promising. For instance, the discussion in an intermediate community may be opened by representatives, followed by a period of open random access for individuals, and closed with summaries by representatives.

The rules would surely differ as to their consequences. The following are criteria by which the effects may be assessed.

(1) Consensus vs. dissensus: To what extent are the ideas, attitudes, and choices expressed by the participants congruent or conflicting?

(2) Stability of consensus: To what extent are the opinions reported by persons while within the group retained after they have left it?

(3) Moderation vs. polarization: Does the rule promote moderation of views previously held or make people hold more intensely to their divergent viewpoints?

(4) Quality of the discussion: How informal, frank and open, and rich in alternatives and new ideas are the discussions?

(5) Ease of procedure: To what extent can the floor be gained and kept, ideas and resolutions "trafficked," with no delays and difficulties resulting from the rule itself?

(6) Legitimation vs. alienation: Do participants feel that they have a fair chance to express themselves; is there an increase or decrease in acceptance of the group and its purposes?

(7) Sustained interest and cohesion: To what extent do the members desire to get together again, to use the same procedure.

2. An alternative communication "tree"

A system that uses only telephones for multi-level dialogue is, in principle, also possible. Starting with groups that each have 30 members, then arranging for conference calls first among the chairmen (or representatives) of 30 such groups, and then for their representatives, would after only 5 steps cover 24 million callers. Thus, all the citizens who could be expected to wish to discuss most issues could be "processed," assuming one hour per group, in a single afternoon. It might be noted, however, that using telephones for this purpose provides an audio-only system (unless picture phones are provided), no ready feedback of tallies, and a great strain on an already over-burdened telephone system--especially when long-distance lines are needed. Still, more than one level of telephone conference seems practical--moving from 30 to 900 (30 groups of 30) and maybe to 30 representative of 900--as long as one links together people from the same neighborhoods. As long as two-way cable TV is not widely available, this would be an especially useful system for groups who wish to dialogue but do not wish others to be able to tune in.

V. ADD-ON AND MULTIPLE USES

A major point, briefly mentioned earlier, deserves elaboration: MINERVA, or public affairs' use of the envisioned communications system can be readily added on to other uses. So, if the other uses of the system, which require the same technological developments as MINERVA, justify the costs involved, MINERVA can get a free, or almost free, ride.

Consider the lowest level unit, that of automated conference calls on telephone lines. Without automation, the calls are difficult to arrange as they involve calling all the persons involved and finding a time they can all be at their places, and costly, as skilled operators may spend hours or even days setting up the call. Now assume that one of the following two arrangements were available: the first involves set groups, such as committees or the management of a corporation, that are dispersed across the country and wish to confer regularly. They may indicate on their respective telephones either that they are ready for conference if need be (by, say, flipping an "on" switch) or unavailable (via an "off" switch). Ther any committee member (or perhaps only the chairman), any plant manager (or the corporate director only, etc.), may initiate a conference call by calling a computer to indicate that one is desired. The call is completed when all stations are "on" (or when whatever the number considered necessary for a quorum is "on") at the pre-arranged time.

Under the second arrangement, each group member may call in to a computer (using the computer as if it were an answer service) to report their availability for conferencing. When the entire group is available, all the telephones will ring. This arrangement does not necessarily have to be limited to "group members only." A committee chairman may call in to the computer requesting to speak to only a portion of the membership. Again, all phones will ring as soon as everybody is ready. Now possible arrangements for conference calling can be compared. The "switch at your phone" system is easier to use than any computer, which would have to be called each time someone is or is not available for dialogue. But the second arrangement requires no modifications in the millions of telephones already installed and allows for the composition of different kinds of groups. Both may well be available one day.

Either of these arrangements would have several significant consequences. No longer would committees or other dispersed groups be forced to travel great(or small) distances in order to convene. Conferences would entail significantly lower economic and psychic costs and may therefore become both more desirable and more frequent. This would, in turn, allow for more communication and, in principle, greater democratization. (Fewer decisions would be delegated to the chairman and/or the staff of committees since the difficulties of calling the committee together for frequent meetings on just a few matters would be reduced.)

On the non-instrumental side, easy and inexpensive conference calls would allow families, e.g., on holidays, and groups of friends to talk together not just two or three at a time, but with all the uncles, cousins, children, and grandchildren--wherever they are.

While the technologies of telephone, over-the-air TV, and radio are quite well known, that of cable television, especially the two-way subdivided system envisioned here, is far less known and hence deserves brief commentary. Unlike most technological innovations, cable television is moving from the countryside into the city. The number of cable television subscribers has grown at an annual rate of 20 to 25 per cent and the system already serves 8 to 10 per cent of the population. A study prepared by Complan Associates has estimated that, by 1980, of the projected 100 million homes in the United States about half would be wired with cable TV.[13] The actual number will of course be affected by the services that the cable renders. If its potential to provide an easy way of shopping, fire alarms, burglar alarms, individualized educational, and cultural programs, etc., is realized, it will be more widely sought-after. If it carries only entertainment, a lower level of penetration may take place.

So far, cable television is used mainly to carry a better signal, a service provided almost exclusively by commercial firms. However, there is a technological capacity for (a) still better,

broader-band amplifiers (able to keep more channels on the same cables without leaking into each other), (b) more "head-ends" (points from which video programs can be originated to form sub-networks that are co-extensive with neighborhoods), and (c) two-way narrow-band channels (to carry voice and digital signals from the home to central locations).

With this new technology, cable television could be adapted to provide, in addition to the innovations mentioned above, medical checking of heart control devices, home terminals for information-retrieval systems, and, far from trivial, instant shopping. Since millions of people now buy through mail catalogues, there seems to be no reason why, if individual products were shown on the local channels and were easy to order, people would not do much of their shopping this way (this is being tried in Dennis, Cape Cod), especially in bad weather. (The saving from this innovation alone--in the cost of transportation, highway building, parking lots, etc.--would more than justify the costs of two-way CATV systems.)[14] And since MINERVA needs basically the same technology as these other services, cable television could be adapted to provide not only a richer and more individualized cultural, instructional, and informational media, but to also provide a participatory system that would allow the citizenry to interact both with each other and with their representatives and leaders.

Finally, the means of national networking or hook up are already in great demand and the wide use of satellites is such that there can be little question that there would be further networking even if MINERVA never took off.

IN CONCLUSION

It is clear that several technical developments (from automatic conference calling to rapid tallying), social innovations (in the area of "rules of access"), and economic investments are needed before a mass participatory system will be available. Research thus far suggests, though, that one version or another of the multi-level system depicted, can provide the needed technology. Moreover, it will enable dialogue among smaller entities, and frequent, easy, "feedback" by the citizens of larger ones. The extent to which this system is used and its effect on our society will depend, in part, on how specifically it is set up (especially on the rules of access that are used) and in part on external factors such as the responsiveness of the government, the spread of college education, and higher per capita income. But it does offer an opportunity for a more open, participatory society.

FOOTNOTES

1. For a review of the literature see Lester Milbrath, Political Participation (Chicago: Rand McNally, 1965).

2. For relevant data see Gabriel A. Almond and Sidney Verba, Civic Culture (Boston: Little, Brown, 1965).

3. For detailed augumentation and references to data, see Amitai Etzioni, The Active Society (New York: Free Press, 1968).

4. For a previous report on MINERVA see another "MINERVA: A Participatory Technology System", in Bulletin of the Atomic Scientists, November, 1971, Vol. XXVII, No. 9, pp. 4-12.

5. In real-time or only after short delays (not more than five minutes), so that they can "sense" each other and thus develop their positions in conjunction with the change in the position of others.

6. For additional discussion and data see Amitai Etzioni, "Consensus Formation in Heterogeneous Systems", in his Studies in Social Change (New York: Holt, Rhinehart, and Winston, 1966), pp. 136-151.

7. Stephen H. Unger, "Technology to Facilitate Citizen Participation in Government", a Center for Policy Research working paper, February, 1972.

8. Five levels would accommodate 24.3 million. Six levels would cover neally 729 million.

9. We gratefully acknowledge a Bell Labs contribution of a bridge to our experiment.

10. Personal communication from Ted Werntz, Center for Policy Research.

11. One study, which compared the audio-only to the video-also system, raised some doubts about this: A.A.L. Reid, "Comparisons Between Telephone and Face-to-Face Conversation", (mimeographed, in the files of the American Telephone and Telegraphed Company, New York, New York).

12. For detailed reasons and relevant calculations see Phillip J. Brendel, "Incasting and the Telephone Network", A Center for Policy Research working paper, February, 1972.

13. Ralph Lee Smith, "The Wired Nation", in The Nation, May 18, 1970, p. 605.

14. The author is indebted to Leonard Ross, economist and research associate at the Center for Policy Research, for this observation.